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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/592,032

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Pierpaolo Boffi

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EXAMINER

SINGH, DALZID E

ART UNIT

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2613

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/592,032	<b>Applicant(s)</b> BOFFI ET AL.	
	<b>Examiner</b> Dalzid Singh	<b>Art Unit</b> 2613	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25-30 and 32 is/are allowed.
- 6) ☒ Claim(s) 16-20, 23, 24 and 31 is/are rejected.
- 7) ☒ Claim(s) 21 and 22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/8/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 16, 23 and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Webb et al (US Pub. No. 2003/0058508).

Regarding claim 16, Webb et al discloses method for modulating optical radiation, as shown in Fig. 1, comprising the steps of:

phase-modulating the optical radiation with a modulation signal, by using a modulator (13), so as to obtain a multi-level phase shift key optical signal comprising a stream of optical pulses, wherein each of said optical pulses has a respective optical phase value related to said modulation signal; and applying to each of said optical pulses a phase-shift having an absolute value and a sign related, for each of the optical pulses, to said respective optical phase value (see paragraph 0019; the amplitude adjustment inherently has an absolute value; the sign is considered as positive and negative value).

Regarding claim 23, wherein said multilevel phase shift key optical signal is a differential multilevel phase shift key optical signal (Webb et al discloses MZ modulator; it is inherent that MZ modulator comprises interferometer which provides differential signal).

Regarding claim 24, Webb et al discloses a method of optical communication comprising transmitting an optical signal at a first location and receiving the optical signal at a second location different from the first location, wherein transmitting comprises modulating the optical signal by performing at least steps of:

phase-modulating (13) the optical signal with a modulation signal, so as to obtain a multi-level phase shift key optical signal comprising a stream of optical pulses, wherein each of said optical pulses has a respective optical phase value related to said modulation signal; and applying to each of said optical pulses a phase-shift having an absolute value and a sign related, for each of the optical pulses, to said respective optical phase value (see paragraph 0019; the amplitude adjustment inherently has an absolute value; the sign is considered as positive and negative value).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 17-20 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Webb et al (US Pub. No. 2003/0058508).

Regarding claims 17-20, Webb et al discloses phase adjustment of the signal and differs from the claimed invention in that Webb et al do not specifically disclose wherein said phase-shift is substantially constant in each of said optical pulses or wherein the absolute value of said phase-shift is equal to or less than about  $\pi/10$  or wherein said modulator has an extinction ratio and the absolute value of said phase-shift is determined as a function of said extinction ratio or wherein the absolute value of said phase-shift is equal to about  $\arctg(1/ER)$ , wherein  $ER_{lin}$  is the extinction ratio. However, Webb et al teaches that the phase is adjustable. Based on this teaching, it would have been obvious to an artisan at the time of the invention to adjust the phase to be within predetermined value. Furthermore, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Swain et al.*, 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; *Minnesota Mining and Mfg. Co. v. Coe*, 69 App D.C. 217, 99 F.2d 986, 38 USPQ 213; *Allen et al. v. Coe*, 77 App D.C. 324, 135 F.2d 11, 57

Art Unit: 2613

USPQ 136. In addition, discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Antonie*, 559 F.2d 239, 618, 195 USPQ 6 (CCPA 1977); *In re Aller*, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955). See also *In re Aller*, 105 USPQ 233 (CCPA 1955) and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore, it would have been obvious to an artisan of ordinary skill to adjust the phase to an optimum or workable value or range by routine experimentation.

Regarding claim 31, as discussed above Webb et al teaches that the phase is adjustable, therefore it would have been obvious to adjust the phase to output a desired function in order to reduce noise.

### ***Allowable Subject Matter***

5. Claims 25-30 and 32 allowed.
6. The following is a statement of reasons for the indication of allowable subject matter:

Claim 25 is allowed because the prior arts of record do not teach or disclose an electro-optical apparatus for modulating optical radiation based on a modulation signal, comprising:

an optical modulator capable of receiving optical radiation and generating a multilevel phase shift key optical signal including a stream of optical pulses, each having

Art Unit: 2613

a respective optical phase value related to said modulation signal, said optical modulator being capable of being driven by a first and a second driving signal ( $S_1$ ,  $S_2$ );

a phase-shifter optically connected to the optical modulator, capable of applying to the phase of each optical pulse a phase-shift having an absolute value and a sign depending, for each of the optical pulses, on said respective optical phase value; and

a logical circuit capable of generating a third driving signal ( $S_3$ ) logically related to said first and second driving signals, the logical circuit being logically connected to the phase-shifter for feeding said third driving signal to said phase-shifter.

Claim 29 is allowed because the prior arts of record do not teach or disclose an optical transmitter comprising an optical source optically coupled to an electro-optical apparatus for modulating optical radiation based on a modulation signal, the electro-optical apparatus comprising:

an optical modulator capable of receiving optical radiation and generating a multilevel phase shift key optical signal including a stream of optical pulses, each having a respective optical phase value related to said modulation signal, said optical modulator being capable of being driven by a first and a second driving signal ( $S_1$ ,  $S_2$ );

a phase-shifter optically connected to the optical modulator, capable of applying to the phase of each optical pulse a phase-shift having an absolute value and a sign depending, for each of the optical pulses, on said respective optical phase value; and

a logical circuit capable of generating a third driving signal ( $S_3$ ) logically related to said first and second driving signals, the logical circuit being logically connected to the phase-shifter for feeding said third driving signal to said phase-shifter.

Claim 30 is allowed because the prior arts of record do not teach or disclose an optical communication system comprising an optical transmitter for transmitting an optical signal, an optical receiver for receiving the optical signal, and an optical communication line connecting the transmitter to the receiver, wherein the transmitter comprises an electro-optical apparatus for modulating optical radiation based on a modulation signal, the electro-optical apparatus comprising:

an optical modulator capable of receiving optical radiation and generating a multilevel phase shift key optical signal including a stream of optical pulses, each having a respective optical phase value related to said modulation signal, said optical modulator being capable of being driven by a first and a second driving signal ( $S_1$ ,  $S_2$ );

a phase-shifter optically connected to the optical modulator, capable of applying to the phase of each optical pulse a phase-shift having an absolute value and a sign depending, for each of the optical pulses, on said respective optical phase value; and

a logical circuit capable of generating a third driving signal ( $S_3$ ) logically related to said first and second driving signals, the logical circuit being logically connected to the phase-shifter for feeding said third driving signal to said phase-shifter.



***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mauro et al (US Patent No. 6,721,081) is cited to show variable duty cycle optical pulses.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dalzid Singh/  
Primary Examiner

Application/Control Number: 10/592,032  
Art Unit: 2613

Page 9